

Access this article online

Quick Response Code:

Website:  
www.ajts.orgDOI:  
10.4103/ajts.AJTS\_117\_18

# Greenish discoloration of plasma: Is it really a matter of concern?

Anila Mani, A. P. Poornima, Debasish Gupta

## Introduction

**B**lood plasma is the yellow liquid component of blood, in which the blood cells in whole blood are normally suspended. The color of the plasma varies considerably from one sample to another from barely yellow to dark yellow and sometimes with a brown, orange or green tinge [Figure 1a] also. In addition to the varying shades of yellow color [Figure 1b], some plasma samples are clear and some are milky or turbid. Occasionally, plasma from hemolyzed samples appears reddish. The visual inspection of the plasma product is crucial to decide whether the unit has to be issued for transfusion or not.

## Observation

We recently came across a donor plasma unit with greenish discoloration [Figure 1a]. The donor was a 29-year-old young, healthy female, regular, nonremunerated, voluntary blood donor who fulfilled all the criteria for blood donation. At our blood centre, the visual inspection of components is a usual protocol. During the process of component separation, unusual green color in the plasma bag was noted [Figure 1a]. We recalled back the donor and a detailed medical history and drug history was elicited from her. The donor revealed that she was on infertility treatment for the last 2 months before donation. It was confirmed that she was on ethinyl estradiol as a part of her treatment. There was no other significant medical or drug history.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

## Pathophysiology of the Event

Already, there is literature evidence for the greenish discoloration of the plasma as a result of pregnancy, intake of birth-control pills containing estrogen, rheumatoid arthritis, and drugs such as sulfonamides or due to sepsis with Gram-negative cryophilic bacteria such as *Pseudomonas*.

The plasma unit was subjected to investigations such as blood culture, copper and ceruloplasmin assay, and bilirubin (total, direct, and indirect). Copper (220 µg/dl) and ceruloplasmin (70 mg/dl) levels were found to be elevated. Blood culture was found to be negative with normal levels of total, direct, and indirect bilirubin.

## Discussion

Ceruloplasmin is a plasma glycoprotein ( $\alpha_2$ -globulin), which acts as a copper carrier and as an acute-phase reactant.

Tovey and Lathe reported green plasma in young women on contraceptive pills and confirmed elevated ceruloplasmin levels in the green plasma units by immunodiffusion and oxidase method in their study.<sup>[1]</sup> The green discoloration of plasma frequently results in the plasma units being discarded or removed from the donor pool from therapeutic use, purely based on its appearance. Clinicians also refuse to transfuse such a discolored plasma product because of the suspicion of *Pseudomonas* contamination.

Wolf *et al.* reported that elevated ceruloplasmin levels are found after estrogen

**How to cite this article:** Mani A, Poornima AP, Gupta D. Greenish discoloration of plasma: Is it really a matter of concern? Asian J Transfus Sci 2019;13:1-2.

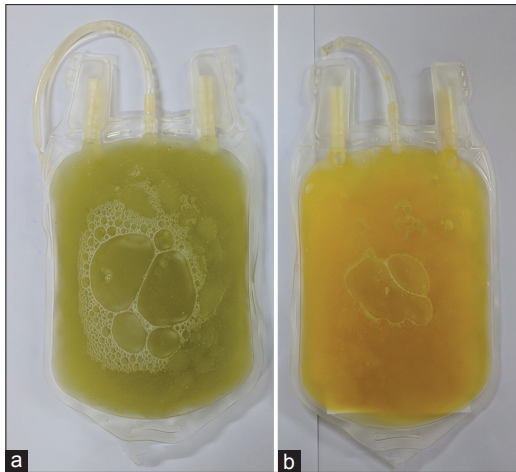
Department of Transfusion  
Medicine, Sree Chitra  
Tirunal Institute for Medical  
Sciences and Technology,  
Thiruvananthapuram,  
Kerala, India

### Address for correspondence:

Dr. Debasish Gupta,  
Department of Transfusion  
Medicine, Sree Chitra  
Tirunal Institute for Medical  
Sciences and Technology,  
Thiruvananthapuram  
- 695 011,  
Kerala, India.  
E-mail: dranilamani@gmail.com

Submission: 22-09-2018

Accepted: 13-01-2019



**Figure 1:** (a) Green-colored plasma; (b) normal yellow-colored plasma

administration in female donors, who were taking oral contraceptives and rheumatoid arthritis.<sup>[2]</sup> The rise in ceruloplasmin in women on oral contraceptives is probably due to the estrogen components, ethinyl estradiol or mestranol. Both of these produce a similar effect.

Serum ceruloplasmin was significantly elevated in patients with rheumatoid arthritis and ankylosing spondylitis. Patients with psoriasis and roentgenologically confirmed arthritis had a significantly elevated mean serum ceruloplasmin concentration. Patients with sarcoidosis showed a tendency towards high ceruloplasmin values if the joints were affected.<sup>[3]</sup> The use of medications including sulfonamides can lead to greenish discoloration of plasma due to sulfhemoglobin production.<sup>[4]</sup>

Cotton *et al.* evaluated the hemostatic potential and capacity of green plasma compared to standard color plasma. This study revealed that plasma from female donors having a green color had a more hypercoagulable thromboelastogram profile for all values (*r*-value, *k*-time, angle, and *mA*) when compared to standard plasma. Differences were also observed with coagulation factor level comparison, with green plasma having higher levels than standard (Factor II, Factor VII, Factor IX, and Factor XI). Using automated thrombogram, green plasma had higher lag time and increased endogenous thrombin potential.<sup>[5]</sup>

Even if there is no harm in transfusing green-colored plasma unit, according to blood bank policy, we are not issuing any discolored plasma product for transfusion and fractionation.

## Conclusion

In view of all the supportive evidence which shows the actual reason for the plasma discoloration, it is evident that the green-colored plasma can be safely transfused and can be subjected to plasma fractionation. We recommend that there should be national guidelines regarding the use of discolored plasma products, so that transfusion practices can be made uniform. Thereby, we can avoid unnecessary discard of blood products.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

1. Tovey LA, Lathe GH. Caeruloplasmin and green plasma in women taking oral contraceptives, in pregnant women, and in patients with rheumatoid arthritis. *Lancet* 1968;2:596-600.
2. Wolf P, Enlander D, Dalziel J, Swanson J. Green plasma in blood donors. *N Engl J Med* 1969;281:205.
3. Koskelo P, Kekki M, Virkkunen M, Lassus A, Somer T. Serum ceruloplasmin concentration in rheumatoid arthritis, ankylosing spondylitis, psoriasis and sarcoidosis. *Acta Rheumatol Scand* 1966;12:261-6.
4. Flexman AM, Del Vicario G, Schwarz SK. Dark green blood in the operating theatre. *Lancet* 2007;369:1972.
5. Cotton BA, Cardenas JC, Hartwell E, Wade CE, Holcomb JB, Matijevic N. Green Plasma has a Superior Hemostatic Profile Compared with Standard Color Plasma. Available from: <http://www.asc-abstracts.org/abstracts/62.03>. [Last accessed on 2018 Sep 10].